Space Weather Forecast

Issued on Tuesday, 19 December 2023 at 01:27 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

---

Space Weather Forecast Headline: Chance of further G1/Minor Geomagnetic Storm intervals day 1 (19 Dec). Chance of isolated Moderate-class flares throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity is Low with occasional mid-level Common-class flares with a peak event from a newly emerged sunspot located in the northeast disc. Of the ten sunspot regions on the visible disc, two regions, the aforementioned one in the northeast and another in the southeast provide the bulk of the significant flare risk at present. Both have seen an increase in the number of spots and areal extent during the period and some modest magnetic complexity. The remaining regions appear simpler and more stable at this time.

No Earth-directed Coronal Mass Ejections (CMEs) were evidenced in available solar imagery.

Solar Wind / Geomagnetic Activity: The solar wind environment was indicative of one or more CME influences, followed by the onset of the fast wind from a coronal hole late in the day on 18 Dec. Speeds were slightly elevated at first, increasing briefly to elevated levels between 18/1500-1600 UTC, then rising more persistently to elevated to strong levels, with a peak of 632km/s at 18/2330 UTC. The associated magnetic field of the solar wind was at largely Moderate levels, with the important north-south direction displaying significant variability. Resultant geomagnetic activity was largely Quiet to Unsettled (Kp2-3), but with a single G2 (Kp6) interval from 18/0600-0900 UTC and a G1 (Kp5) interval from 18/2100-2400 UTC.

Energetic Particles / Solar Radiation: Proton flux continued to trend back to resting background levels, having been raised in response to the recent larger flares from AR3514. It was below the S1/Minor Radiation Storm threshold throughout the last 24 hours.

Four-Day Space Weather Forecast Summary

Solar Activity: Low with a chance of becoming Moderate with isolated Moderate-class flares. The greatest risk of significant flares is currently from the largest regions in the northeast and southeast, although may be supplemented by the potential for several new or returning regions to rotate over the eastern horizon during the period.

Solar Wind / Geomagnetic Activity: There is one further weak possible CME in the forecast, with arrival mooted for later day 1 (19 Dec) or early day 2 (20 Dec). The other component of the forecast, a persistent solar fast wind stream, has arrived with ongoing strong solar winds that should slowly ease in the coming days to elevated or slightly elevated levels, ahead of a further fast wind enhancement on day 4 (22 Dec) with elevated winds expected at peak.

Geomagnetic activity is expected to be at Active to G1/Minor Storm levels at first on day 1 (19 Dec) soon easing to become Quiet to Unsettled, with isolated Active intervals likely late 19 Dec. Activity then Quiet to Unsettled from day 2 to day 3 (20-21 Dec), before increasing day 4 (22 Dec) to Unsettled to Active, with a slight chance of G1/Minor Storm conditions at peak.

Energetic Particles / Solar Radiation: Proton flux is now at Background levels and expected to remain at similar levels unless any further significant flaring occurs.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2023. All Rights Reserved.

Space Weather Forecast

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	50	10	1	20
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	35	30	30	25
Very Active	R3 to R5 X	No	3	3	3	2

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2023. All Rights Reserved.